

Climate change projections over India by a downscaling approach using PRECIS

Prasanta Kumar Bal, Andimuthu Ramachandran, Kandasamy Palanivelu, Perumal Thirumurugan, Rajadurai
Geetha and Bhaski Bhaskaran
Asia-Pacific journal of atmospheric sciences, 52(4), 353-369.

Abstract: This study presents a comprehensive assessment of the possible regional climate change over India by using providing regional climates for impacts studies (PRICIS), a regional climate model (RCM) developed by Met Office Hadley centre in the United Kingdom. The lateral boundary data for the simulations were taken from a sub-set of six members sampled from the Hadley Centre's 17- member Quantified Uncertainty in Model Projections (QUMP) perturbed physics ensemble. The model was run with 25 km x 25 km resolution from the global climate model (GCM) – HadCM3Q at the emission rate of special report on emission scenario (SRES) A1B Scenarios. Based on the model performance, six member ensembles running over a period of 1970-2100 in each experiment were utilized to predict possible range of variations in the future projections for the periods 2020s (2005-2035), 2050s (2035-2065) and 2080s (2065-2095) with respect to the baseline period (1975-2005). The analysis concentrated on maximum temperature, minimum temperature and rainfall over the region. For the whole India, the projections of maximum temperature from all the six models showed an increase within the range 2.5°C to 4.4°C by end of the century with respect to the present day climate simulations. The annual rainfall projections from all the six models indicated a general increase in rainfall being within the range 15-24%. Mann-Kendall trend test was run on time series data of temperatures and rainfall for the whole India and the results from some of the ensemble members indicated significant increasing trends. Such high resolution climate change information may be useful for the researchers to study the future impacts of climate change in terms of extreme events like floods and droughts and formulate various adaptation strategies for the society to cope with future climate change.

Keywords: Climate change GCM RCM PRECIS Mann-Kendall trend test